DOCUMENT RESUME

ED 243 665 SE 044 396

AUTHOR Fritz-Quincy, Debbie
TITLE Florida's Manatee. An Educator's Guide. Third Edition Revised.
INSTITUTION Florida Audubon Society, Maitland.; Florida State Dept. of Natural Resources, Tallahassee.
PUB DATE 83
NOTE 43p.; Publication of this guide was supported by the Florida Power and Light Company.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Animals; Elementary Education; *Elementary School Science; Environmental Education; Language Arts; *Learning Activities; Marine Biology; Resource Materials; Science Activities; Science Education; *Wildlife; Zoology
IDENTIFIERS *Endangered Species; Florida; *Manatees

ABSTRACT

This revised and updated guide provides resources for teaching about the Florida manatee, a nearly hairless, thick-skinned marine mammal without hindlimbs and with paddle-like forelimbs. The manatee (an endangered species) is sometimes called a sea cow. The guide includes: (1) a vocabulary list; (2) a list of suggested readings; (3) an annotated list of selected slide programs, filmstrips, and films; (4) brief descriptions of possible classroom and field activities (such as using word games, designing wall murals, using guest speakers, preparing research papers, organizing skits and role playing sessions, investigating the mermaid/manatee debate, visiting a manatee sanctuary, conducting school and boat ramp surveys, and making the public aware about the manatee); (5) a manatee awareness questionnaire; and (6) activity sheets suitable for duplication. The latter include such vocabulary activities as word searches, a crossword puzzle, a connect-the-dot activity, and a field study form. (JN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED243665

AN EDUCATOR'S GUIDE

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

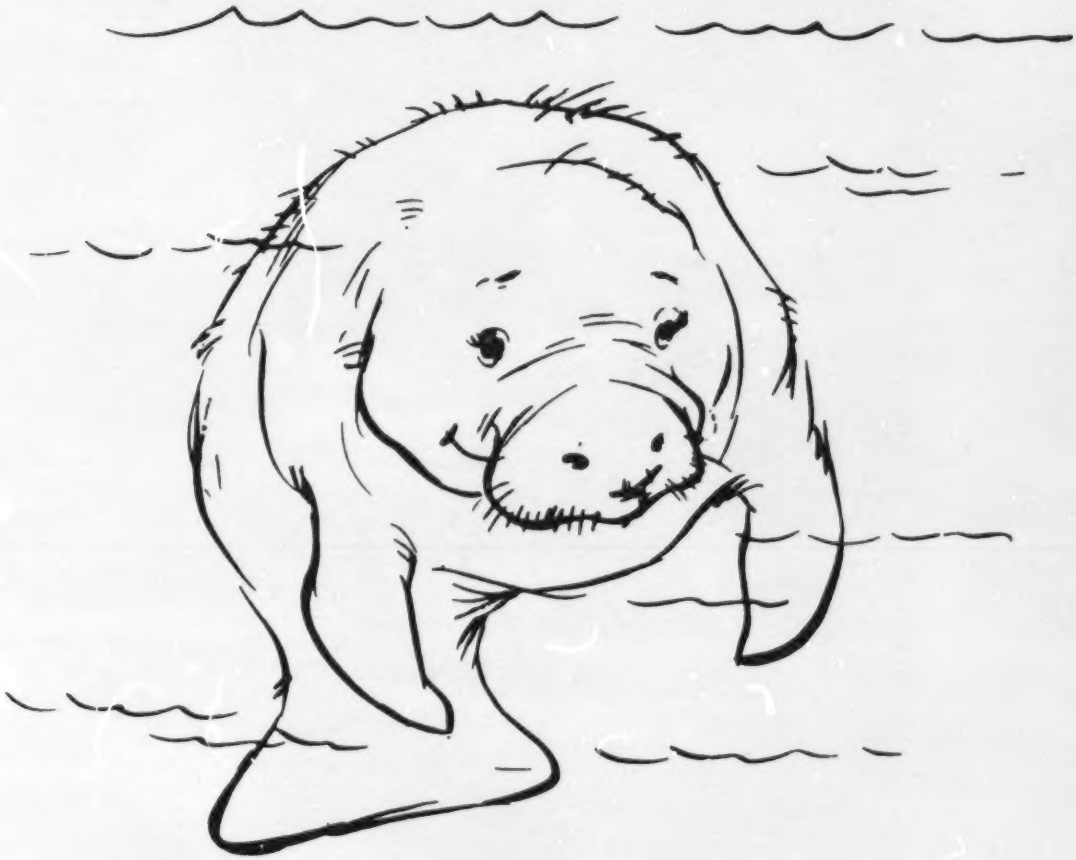
Debbie Fritz

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SE044396

FLORIDA'S MANATEE

AN EDUCATOR'S GUIDE



Produced by
Debbie Fritz, Director
Educational Services Division
Florida Audubon Society

In cooperation with
The Office of Education and Information
Florida Department of Natural Resources
1980

Second Edition
Reprinted courtesy of the Florida Power and Light Company
1982

Third Edition Revised
Reprinted courtesy of Florida Power and Light Company
1983

INTRODUCTION

In response to the overwhelming interest in FLORIDA'S MANATEE - AN EDUCATOR'S GUIDE, we are pleased to continue the distribution of this publication. As a part of the Florida Power and Light Company's continuing program of Manatee Public Awareness, this guide has been revised and updated for use as a teaching resource. Sections from previous editions have been omitted due to the availability of two recent publications, BOATER'S GUIDE TO MANATEES and THE WEST INDIAN MANATEE IN FLORIDA, also produced by Florida Power and Light. We urge you to use them as companions to this guide.

Debbie Fritz-Quincy
Eco/Interface Evaluations
P. O. Box 955
Hobe Sound, FL 33455

VOCABULARY

ABIOTIC — everything that is not living or has never lived in the environment.

ADAPTATION — the way an organism becomes better suited for its environment.

AGGREGATION — a mass of distinct things gathered together in a group.

AGILE — quick and easy in movement.

ALGAE — a group of primitive plants, one-celled or many-celled, containing chlorophyll and found in water or damp places.

AQUATIC — living or growing in, on or near water; having a water habitat.

BARNACLE — a shell-bearing sea animal that attaches itself to rocks, ship bottoms, etc.

BIOME — large land area with similar organisms and physical environment.

BLUBBER — a thick, insulating layer of fat beneath the skin of marine animals.

BOTANY — the study of plants.

BRACKISH — of water, having less salt content than sea water, but still undrinkable.

BULL — term used to describe a male manatee.

BUOYANCY — the ability to float.

CALF — term used to describe a newborn or young manatee.

COMMUNITY — all the plants, animals and decomposers in a given area.

CONFLICT — a struggle between two or more parties.

CONGREGATION — a gathering.

CONSERVATION — the care and protection of our natural resources, such as forests, endangered species, etc.

COW — term used to describe an adult female manatee.

DISCHARGE — to release, as in warm water, from power plants into natural waters.

DOCILE — easy-going, mild mannered.

DUGONG — one of two species of aquatic mammals in the order Sirenia; the dugong is distinguished by a forked tail.

ECOLOGY — the study of the interrelationships which exist between organisms and their environment.

EFFLUENT — liquid which flows away from a containing space or main waterway; wastewater discharge.

EMERGENT — protruding above the water's surface, as do cattails.

ENDANGERED — placed in jeopardy; exposed to loss.

ENDANGERED SPECIES ACT OF 1973 — strong legislative action which serves to protect various species of native fish and wildlife that are threatened with extinction.

ENVIRONMENT — surroundings; conditions surrounding and affecting the development of an organism.

ESTRUS — period in a female mammal during which ovulation occurs and the animal is receptive to mating.

ESTUARY — a semi-closed coastal body of water which is connected to the open sea and within which sea water is diluted with fresh water; highly productive body of water.

EXTERMINATE — to destroy entirely; wipe out.

EXTINCT — having died out; no longer in existence, as in the case of the Steller Sea cow.

FEDERAL MARINE MAMMAL PROTECTION ACT OF 1972 — prohibits the sale, taking, possession, importation and transportation of certain marine mammals in the United States.

FLORIDA MANATEE SANCTUARY ACT OF 1978 — legislative action which requires slow speeds by boat traffic in designated areas where manatees are known to congregate at certain times during the year.

FLUCTUATIONS — to move up and down, unstable.

FLUKE — term applied to the large flat tail of the manatee.

FLUVIAL — of, found in or produced by a river.

FOOD CHAIN — transfer of energy through a biotic community from producer, consumer to decomposer.

FOOD WEB — a combination of interconnected food chains.

HABITAT — a place where a plant or animal lives.

HARASSMENT — the act of worrying or tormenting, as to harass an animal.

HERBICIDE — a chemical agent that destroys or inihibits plant growth.

HERD — term used to describe a group of manatees.

HYACINTH — an aquatic plant of the lily family, which has been introduced into Florida's waterways and is considered an exotic pest.

INSECTICIDE — chemical used to kill insects.

LACTIC — of or obtained from milk.

LETHARGIC — lazy, listless.

MAMMAL — a large class of warm blooded animals, which have a body covered with hair and the females have milk-secreting glands for feeding their offspring.

MANDATORY — an order of law that must be followed.

MARINE — of or pertaining to the sea.

MERMAID — according to legend, a sea creature with the head and body of a woman and the tail of a fish.

MONOFILAMENT — a type of line used in fishing.

MORPHOLOGY — a branch of biology which deals with the structure and form of an organism at any state of its life history.

MORTALITY — the ratio of deaths to populations.

NICHE — an especially suited place or position.

ORGANISM — any living thing.

PARASITE — an organism that receives its nourishment from another living organism.

PESTICIDE — a chemical agent that destroys undesirable organisms.

PHYSIOLOGY — the study of functions and vital processes of living organisms.

POACHING — the act of hunting or catching game illegally.

POLLUTION — the presence of any undesirable substance in the environment.

POLYANDROUS — the practice of having more than one male mate at a time.

PROBOSCIS — the snout of a manatee, used to obtain food.

PROPELLER — a device having a series of blades mounted at an angle in a revolving hub, for driving forward a boat or aircraft.

PROPULSION — being propelled or moved forward.

RANGE — distance travelled; limited area.

REFUGE — shelter or protection from danger.

RESIDUE — that which is left after part is removed; remainder.

SANCTUARY — a place of refuge or protection.

SENSITIVITY — reaction to some type of agent.

SIRENIANS — in zoology, the order of aquatic mammals which include the manatees and dugongs; nearly hairless, thick-skinned mammals without hindlimbs and with paddle-like forelimbs.

SKEG — an extension of the stern edge of the keel of a boat; which in some cases, passes under the propeller and supports the rudder post.

SPRING — a flow of water from the ground.

STATUS — rank; position.

STELLER SEACOW — of the manatee family, an extinct species.

SUBMERGE — to place or sink beneath the water's surface.

SUCCESSION — the orderly change of one biotic community to another.

TOXIC — poisonous.

TRIBUTARIES — a stream flowing into a larger river.

TROPICAL — pertaining to the region between the tropics of Cancer and Capricorn, which has a very warm climate.

VALVES — a membrance structure which opens and closes the nostril of a manatee or seacow, permitting the animal to breathe.

VANDALISM — the act of destroying or damaging.

VEGETARIAN — one who eats no meat, only vegetables (plants).

VULNERABLE — open to or easily hurt by criticism or attack.

SUGGESTED READING

Allsopp, W. H. L. 1960. The manatee: ecology and use for weed control. Nature (Lond.) 188(4752):762.

Asper, E. D. 1979. Commitment to Manatee Health and Research, Sea World's Role. Florida Conservation News 15(2)14-17.

Bangs, O. 1895. The present standing of the Florida manatee, Trichechus latirostris. (Harlan), in the Indian River waters. Am. Nat. 29: 783-787.

Barbour, T. 1937. Birth of a manatee. J. Mammal. 18(1): 106-107.

Barrett, T. 1935. Notes concerning manatees and dugongs. J. Mammal. 16:216-220.

Bavendam, Fred. 1983. Manatees - Mythical Mermaids of the Sea. Ocean Realm. Winter: 72-74.

Beddard, F. 1897. Notes upon the anatomy of a manatee (Manatus inunguis) lately living in the Society's gardens. Proc. Zool. Sox. (Lond.) 1897:47-53.

_____. 1902. Mammalia. MacMillan Co., New York. 605pp.

Bertram, G., and C. Bertram. 1964. Manatees in the Guianas. Zoologica (N.Y.) 49(6): 115-120.

Beusse, D.O. 1978. Diagnosis and treatment of injured manatees. Paper presented at the West Indian Manatee Workshop, Orlando, FL., 27-29 March 1978. Unpubl.

Brimley, C.S. 1931. The manatee in North Carolina. J. Mammal. 12: 320-321.

Brown, A. 1878. The Sirenia. Am. Nat. 12: 291-298.

Brownell, R.L., Jr., K. Ralls, and R. Reeves. 1978. Report of the West Indian Manatee Workshop, Orlando, FL, 27-29 March 1978. Unpubl. 26pp., 3 appendices.

Cahn, A. 1940. Manatees and the Florida freeze. J. Mammal. 21(2) 222-223.

Campbell, H. W. 1976a. Endangered species: the manatee. The Florida Naturalist (April): 15-20.

_____. 1976b. The Florida manatee and related species. The Plaster Jacket (The Florida State Museum) No. 25, July.

_____. 1976c. Untitled status report on manatees from National Fish and Wildlife Laboratory, Gainesville, FL, last update 9 October 1976.

_____. 1976d. An evaluation of the manatee (Trichechus manatus) population in the vicinity of the proposed Cross Florida Barge Canal with assessment of potential impact. Appendix B, pp. F1-F38, in Cross Florida Barge Canal Restudy by Florida Game and Fresh Water Fish Commission.

Campbell, H. W. and A. B. Irvine. 1978. Manatee mortality during the unusually cold winter of 1976-1977. Paper presented at the West Indian Manatee Workshop, Orlando, FL, 27-29 March 1978. Unpubl.

Canova, A. 1885. Life and adventures in South Florida. Tribune Printing Co., Tampa, FL, 145pp.

Daves, C. L., S. A. Earle, and F. C. Croley. 1967. The offshore benthic flora of the southwest coast of Florida. Bull. Marine Sci., 17: 211-231.

Dawson, M. R. 1967. Fossil history of the families of recent mammals, order Sirenia. Page 45 in S. Anderson and J. K. Jones, Jr., eds. Recent mammals of the world. Ronald Press Co., New York.

Domning, D. P. 1983. Marching Teeth of the Manatee. Natural History 5:9-11.

Douglas, Sue. 1982. To Save a Vanishing Floridian. Oceans 15(6) 8-15.

Erdman, D. S. 1970. Marine mammals from Puerto Rico to Antigua. Mammal. 51: 636-639.

Florida Power and Light Company. 1983 Revised. Boater's Guide to Manatees: The Gentle Giants. (Featuring maps of manatee sanctuaries in Florida). 22pp.

Forrester, D. J., F. H. White, J. C. Woodward, and N. P. Thompson. 1975. Intussusception in a Florida manatee. Journal of Wildlife Diseases. Vol. II, October.

Gray, Ralph. 1983. Helping the Manatee. National Geographic World (Nov) 98:11-15.

Grunwald, H. A. 1970. Gentle Siren in Distress. Life 3(5):97-100-

Gunter, G. 1942. Further miscellaneous notes on American manatees. J. Mammal. 23(1): 89-90.

Harlan, R. 1824. On a species of lamantin (Manatus latirostris n.s.) resembling the Manatus senegalensis (Culver) inhabiting the east coast of Florida. J. Academy Nat. Sci. Phila., 3: 390-394.

Hartman, D. 1968a. The status of the Florida manatee in captivity. Fla. Bd. Conserv. Div. Salt Water Fish. 22pp.

_____. 1968b. Ecology and behavior of the American manatee, Trichechus manatus Linnaeus, at Crystal River, Citrus County, Florida. Nat'l. Geogr. Soc. Res. Rpt., 1968 Projects, pp. 157-161.

_____. 1969. Florida's manatees, mermaids in peril. Nat'l. Geogr. Mag. 136(3): 342-353.

_____. 1971. Behavior and ecology of the Florida manatee, Trichechus manatus latirostris (Harlan) at Crystal River, Citrus County. Ph.D. Thesis, Cornell University, Ithaca, New York. 285pp.

_____. 1974. Distribution, status, and conservation of the manatee in the United States. Unpublished. 247pp.

_____. 1976. Manatee in J. N. Layne, ed. Inventory of rare and endangered biota of Florida. Prepared by the Florida committee on rare and endangered plants and animals.

_____. 1979. Ecology: Behavior of the manatee (Trichechus manatus) in Florida. Bull. Mar. Sci. Gulf Carib., 14(a): 306-341.

Husar, S. 1974. Survey of the order Sirenia, Part 2: The West Indian Manatee (Trichechus manatus). National Fish and Wildlife Lab., Washington, D.C.

Irvine, A. B., and H. W. Campbell. 1978. Aerial survey of the West Indian manatee, Trichechus manatus, in the southeast United States. J. Mammal., 59: 613-617.

Irvine, A. B., D. K. Odell, and H. W. Campbell. 1978. Manatee mortality in the southeast United States from 1974 to 1977. Paper presented at the West Indian Manatee Workshop, Orlando, FL, 27-29 March 1978. Unpubl.

Jacobs, Francine. 1979. Sewer Sam, The Sea Cow. Walker and Company, New York, New York.

Jones, J., and R. Johnson. 1967. Sirenians. Pages 366-373 in S. Anderson and J. Jones, Jr., eds. Recent mammals of the world, a synopsis of families. Ronald Press, New York, New York.

Larson, L. 1969. Aboriginal subsistence technology of the southeastern coastal plain during the late prehistoric period. Unpubl. Ph.D. Thesis, University of Michigan, Ann Arbor, MI.

Latimer, G. 1864. Letter offering to forward manatees for the society's menagerie. Proc. Zool. Soc. Lond., pp. 167-168.

Layne, J. 1965. Observations on marine mammals in Florida waters. Bull, Florida St. Mus. Biol. Sci. 9(4): 133-181.

McAtee, W. L. 1950. Possible early record of a manatee in Virginia. J. Mammal., 31: 98-99

McNulty, Faith. Manatees. The New Yorker Magazine, February 26, 1979, New York, New York.

Miller, G. S. 1918. Mammals and reptiles collected by Theodoor de Booy in the Virgin Islands. Proc. U.S. Nat. Mus., 54: 507-511.

Moore, J. 1951a. The status of the manatee in the Everglades National Park, with notes on its natural history. J. Mammal. 32(1): 22-36.

_____. 1951b. The range of the Florida manatee. Q. J. Fla. Acad. Sci. 14(1): 1-19.

_____. 1956. Observations of manatees in aggregations. Am. Mus. Novit. 1811: 24.

_____. 1957. Newborn young of a captive manatee. J. Mammal. 38(1): 137-138.

Muries, J. 1872. On the form and structure of the manatee. Trans. Zool. Soc. Lond., 8: 127-202.

Odell, D. K. 1978. Growth of a West Indian Manatee, Trichechus manatus, born in captivity. Paper presented at the West Indian Manatee Workshop, Orlando, FL, 27-29 March 1978. Unpubl.

Odell, D. K., and J. E. Reynolds. 1978. Observations on manatee mortality caused by flood control dams in South Florida. Paper presented at the West Indian Manatee Workshop, Orlando, FL, 27-29 March 1978. Unpubl.

Oke, V. 1967. A brief note on the dugong at Cairns Oceanarium. Int. Zoo Yb. 7: 220-221.

Parker, G. 1922. The breathing of the Florida manatee (Trichechus latirostris). J. Mammal. 3(3): 127-135.

Peterson, S. L. 1974. Man's relationship with the Florida manatee, Trichechus manatus latirostris (Harlan): an historical perspective. Unpubl. Masters Thesis. University of Michigan, Ann Arbor, MI. 78pp.

Powell, J. A. 1978. Status of manatee population in Crystal River, Citrus County, FL. Paper presented at the West Indian Manatee Workshop, Orlando, FL, 27-29 March 1978. Unpubl.

Powell, J. A. and G. Rathbun. 1978. Puerto Rico manatee survey, 21-29 June 1978. Unpublished trip report, National Fish and Wildlife Lab., U.S. Fish and Wildlife Service, Gainesville, FL. 18pp.

Powell, J. A. and J. C. Waldron. 1978. Status of the manatee population in Blue Spring, Volusia County. Paper presented at the West Indian Manatee Workshop, Orlando, FL, 27-29 March 1978. Unpubl.

Raloff, J. 1980. Protecting Florida's sirens. Science News. 117(6): 91.

Reilly, Patricia. 1982. You Can't Not Love a Manatee. Sky Magazine (Sept):18-24.

Reynolds, J. E. 1976. The Florida manatee: myth versus truth. Sea Frontiers 22(4): 209-214.

_____. 1978. The Semisocial Manatee. Natural History, 88:(2) 44-53.

Rose, P. M. 1978. A preliminary report on the aerial census of the West Indian manatee, Trichechus manatus, in and around several "once-through cooling" power plant effluents: December-March 1977-1978. Paper presented at the West Indian Manatee Workshop, Orlando, FL 27-29 March 1978. Unpubl.

Ronald K., L. J. Selley, and E. C. Amoroso. 1978. Biological synopsis of the manatee. College of Biological Science, University of Guelph, Guelph, Ontario, Canada. International Development Research Centre, Ottawa, Canada.

Schevill, W., and W. Watkins. 1965. Underwater calls of Trichechus (manatee). Nature (Lond.) 205(4969): 373-374.

Scholander, P., and L. Irving. 1941. Experimental investigations on the respiration and diving of the Florida manatee. J. Cell. Comp. Physiol. 17(2): 169-191.

Simpson, G. 1930. Sea sirens. The strange mammals responsible for the ancient ideas of mermaids. Nat. Hist., New York. 30(1): 41-47.

_____. 1932. Fossil sirenia of Florida and the evolution of the sirenia. Bull. Am. Mus. Nat. Hist., New York, New York. 59: 419-503.

Sleeper, B. 1980. The case of the mistaken manatees. Adventure Travel 2(8): 42-47.

Stejneger, L. 1886. On the extermination of the great northern seacow (Rhytina). Am. Geogr. Soc. Bull. 4: 317-328.

Tangley, L. 1979. Manatees on the brink. Defenders Magazine. 54(6): 348-353.

Terlander, R. 1980. Mermaid in a man's world. National Wildlife. 18(1): 28-35.

Thorne, R. F. 1954. Flowering plants of the waters and shores of the Gulf of Mexico. Pp. 103-202, in Gulf of Mexico: its origin, waters, and marine life. Fish and Wildlife Serv., Fish Bull. 89.

Townsend, C. T. 1904. Notes on the manatee or sea cow. Rep. New York Zool. Soc. 8: 85-87.

True, F. 1884. The Sirenians or sea cows. Fish and Fish. Indust. 1884(1): 114-128.

Van Meter, Victoria B. 1982. The West Indian Manatee in Florida. Applied Biology, Inc. for Florida Power and Light Company. 29pp.

Voss, G. L., and N. Voss. 1955. An ecological study of Soldier Key, Biscayne Bay, FL. Bull. Mar. Sci. Gulf Carib. 5: 203-229.

Walker, E. 1964. Mammals of the world. Johns Hopkins Press, Baltimore, MD. 3 Vols. 1500pp.

Whitehead, P. J. P. 1977. The former southern distribution of new world manatees (Trichechus spp.). Biol. J. Linn. Soc. 9: 165-189.

Whitfield, W., and S. Farrington. 1975. An annotated bibliography of Sirenia. Florida Marine Research Publications No. 7. 44pp.

NOTE: This reference list is offered as a general listing. Serious researchers should consult The American Society of Mammalogists Special Publication No. 5. This document identifies foreign research on the manatee.

MEDIA

Selected slide programs, filmstrips and films on the manatee (See Resources list for addressees)

A Time for Choice

This 16mm film offers the viewer a comprehensive look at the manatee and other endangered wildlife in Georgia. Produced by the Georgia Department of Natural Resources, Information Office, 270 Washington St. S.W., Atlanta, GA 30334; 1978.

A Second Chance

This 16mm film deals with a variety of endangered species and their interaction with the electrical power industry. Produced by the Edison Electric Institute, a number of Florida species are highlighted, including the manatee; 1981 (available free from FPL).

Silent Sirens: Manatees in Peril

This 23-minute film covers the biology of the manatee, its struggle for survival, current research and protection effort. Produced by the Florida Audubon Society in cooperation with the Florida Department of Natural Resources and the Florida Power and Light Company; 1980. Copies available free from DNR, FPL and Florida Film Library. Rental fee from the Florida Audubon Society, 1101 Audubon Way, Maitland, FL 32751.

The Manatee

A 10-minute film which serves as a good introduction to the manatee's ecology and why it is endangered. Available from Cine Comm Productions, P.O. Box 05909, Fort Myers, FL 33905 (Rental fee).

The Mysterious Manatee

Filmed and produced in Crystal River, Florida. This 14½-minute 16mm film deals strictly with the biology of the animal. It is geared for secondary schools and adult groups, with copies of a script and teacher's guide also available. Produced by The Pet Project, Inc., 121 N.W. Crystal Street, Crystal River, FL 32629 (Rental fee).

Mermaids: Fact or Fiction? The Florida Manatee

This 20-minute slide/tape or filmstrip presentation includes current research and the fight to save the manatee from extinction. Produced under contract to Florida Power and Light, single copies were sent in filmstrip form to each Florida school district in 1979. Also available from the Florida Audubon Society, 1101 Audubon Way, Maitland, FL 32751.

Manatees - A Living Resource

This filmstrip discusses the biology of the manatee and what is being done to save it from extinction. Produced by Buchan Publications, P.O. Box 7218, St. Petersburg, FL 33734, 1984.

RESOURCES & MATERIALS

Available from:

Eco/Interface Evaluations (EIE)

Manatee Awareness Programs

P.O. Box 955

Hobe Sound, FL 33455

Florida Department of Natural Resources (DNR)

Office of Education and Information

3900 Commonwealth Blvd.

Tallahassee, FL 32303

(904) 488-7326

Florida Power and Light Company (FPL)

Senior Educational Coordinator

P.O. Box 529100

Miami, FL 33152

(305) 552-3552

Save the Manatee Committee (FAS)

1101 Audubon Way

Maitland, FL 32751

(305) 647-2615

CLASSROOM & FIELD ACTIVITIES

WORD GAMES

Word games can help strengthen your student's vocabulary. Using words such as manatee, dugong or Sirenian, have the students see how many words they can make out of the letters in each word; OR, design a crossword puzzle or a word scramble, using the vocabulary list included in this guide.

WALL MURALS

Design a wall mural at your school, depicting a day in the life of a manatee. Include things such as other animals, vegetation, boats, divers, and swimmers.

GUEST SPEAKERS

Locate someone in your community to present a program on the manatee. This person could be a representative of FP&L, the Department of Natural Resources, local Audubon chapter, college or high school biology professor.

CREATIVE WRITING

Have each student compose their own short story about a manatee. Share each story with the class.

TO LIVE, I NEED . . .

Manatees require suitable habitat in order to survive. Have your students make a list — To live, the manatee needs . . . See how many items the students can come up with that the manatee needs to survive.

WHY SAVE THE MANATEE?

Is the manatee really worth saving? Why should we be concerned about this marine mammal? Have each student write a short essay on why the manatee should be protected from extinction.

POSTERS AND BROCHURES

Sponsor a school-wide poster and/or brochure contest on the manatee.

THE MANATEE IN SONG

Have your class write poems or songs about the manatee. Share each original creation with the rest of the class.

RESEARCH REPORTS

Have each student go to the library and prepare a research report on manatees and dugongs. Suggested topics may include Florida's manatee sanctuary areas, the Steller Sea Cow, causes of death of manatees in Florida, etc.

OBITUARIES

Familiarize your students with the word obituary. Instruct the students to write their own death notice about a manatee using different ways that manatees have been killed (boat propellers, crushed by barges and locks, bullets, etc.). Expand on them as much as possible, to make it similar to obituaries that you might read in the newspaper. Include living relatives, how the animal died, where to send memorials, etc. Share each obituary with the entire class.

NEWS STORIES

Have each student put together their own news story about the manatee. These can be either for a newspaper, radio or television broadcast. The subjects of the news stories should vary from student to student as much as possible. Have each student act out his news story to the class. An additional incentive would be to offer a "newscaster's award" for the best coverage of a news story about an endangered species. If possible, video-tape these presentations to share with others.

SKITS/ROLE PLAYING

Divide the class into 3-5 groups and have each group put together skits about the manatee. One possible setting could be at the discharge site at a power plant during the winter, where a congregation of manatees is present. A boater comes speeding through a manatee sanctuary area, ignoring the speed zone signs and

injured one of the manatees. Characters other than the boater and manatees could be a power plant worker, a Florida Marine Patrol officer or an environmentalist.

WHO'S RIGHT?

Divide the class into 3 groups - manatees, divers and boaters. Discuss the Florida Manatee Sanctuary Act as it applies to all persons involved. Allow each student to discuss their feelings about their rights to be where they want to be and do what they want to do.

WHAT DOES A MANATEE LOOK LIKE?

Have the students write down at least ten different words describing the manatee. Have the students draw the face and body of the manatee.

MERMAID/MANATEE DEBATE

When Christopher Columbus sailed the ocean blue in 1492, he and his sailors brought back with them tales of "mermaids," sea creatures with the head and body of a woman and the tail of a fish. Were these just sea stories? Had the sailors been at sea for a long, long time?

Scientists later attributed these legendary reports of mermaids to be manatee or dugong sitings. Who was right?

Have the students research this early legend, finding out where such sitings occurred and other pertinent facts. Were these "mermaids" seen in areas that formerly had populations of manatees or dugongs? Hold a debate between the "early sailors" and the "scientists" to decide what these sea creatures really were.

WHERE DO SIRENIANS LIVE?

Provide each student with a map of the world. Have them do research in the library to find out where manatees and dugongs range. Outline these areas on the map and tell which species is or was found there.

I AM A MANATEE

Have your students lie down on the ground and pretend to be a manatee in a protected sanctuary area. While they pretend to be a manatee, tell them that they have just been struck by a motorboat and are badly injured or that they have just been chased out of a warm water spring or the effluent of a power plant on a cold, winter day. Have the students write down their thoughts on being a manatee and share each students feelings with the rest of the class.

SCHOOL SURVEYS

Conduct a school-wide survey on the manatee to find out how much other students know about the manatee. Your questions might include:

What is Florida's official marine mammal?

What is a manatee or sea cow?

Why are manatees an endangered species?

FIELD OBSERVATIONS

If you are fortunate enough to be in an area where manatees are present, visit a manatee sanctuary to make first hand observations of the manatee's behavior. Note descriptive marks such as scars, size, time between breaths, etc.

BOAT RAMP SURVEYS

Assign a group of students to spend a couple of hours talking to boaters about manatees while distributing manatee literature at public boat ramps. Ask boaters if they have sighted any manatees in the area; if they have noticed the manatee speed zone signs indicating the protected areas, and; if other boaters were observing these signs. Be sure that the students are unobtrusive with the boating public and emphasize that this is a public service project.

MANATEE SANCTUARY AREAS

Visit a manatee sanctuary area near your community on a weekend(s) during the period of November 15 through March 31. Have pairs of students observe these

slow speed zones and see how many boats slow down and observe the slow or idle speed zone signs. Have the students look for manatees and see how many are in the area.

MANATEE PUBLIC AWARENESS

Develop a list of bait and tackle shops, dive shops, boat dealers, piers and marinas. Use the telephone directory or the local Chamber of Commerce for assistance. The U. S. Power Squadron may be helpful, too!

Since the most common cause of death among the manatees is from wounds suffered after being struck by boat propellers, you can help save the manatee by distributing manatee literature to these select locations where boat operators gather.

Assign student teams to a section to be covered. If you contact your local television station or newspaper, they should pick up on it quickly. Students should introduce themselves to the shop owners and request permission to set up a small display or to leave literature where the customers could pick it up. Offer to replenish the supply upon the owner's request.

To obtain sufficient materials for distribution, check with your instructor for sources found in "Florida's Manatee - An Educator's Guide." Be sure students remember that this is a public service request and they should be sure not to force the material on the store owner or manager.

SCHOOL ASSEMBLIES

At the conclusion of your unit on the manatee, present a program on the subject to selected classes at your school. Include a short slide presentation, skits, original songs, poems and news stories to round out the program.

MANATEE AWARENESS QUESTIONAIRE

DIRECTIONS: Check the appropriate blank.

1. Historically, manatees were mistaken for mermaids and sirens. Today their common name is

   _____ a. Water pig.

   _____ b. Sea Cow.

   _____ c. Dugong.

   _____ d. None of the above.

2. A manatee is a

   _____ a. mammal.

   _____ b. fish.

   _____ c. reptile.

   _____ d. amphibian.

3. Manatees breathe via

   _____ a. gills.

   _____ b. nostrils and lungs.

   _____ c. air hole and lungs.

   _____ d. diffusion.

4. Manatees are found in

   _____ a. fresh water.

   _____ b. salt water.

   _____ c. brackish water.

   _____ d. all of the above.

5. Approximately how many manatees are there in the U. S. today?

_____ a. 20,000 or more

_____ b. 10,000 or more

_____ c. 5,000

_____ d. 1,000 or less

6. One main reason for manatees originally becoming endangered -

_____ a. hunted by man

_____ b. the Ice Age

_____ c. toxins from red tides

_____ d. tidal waves

7. The greatest single threat to manatees is now

_____ a. pollution

_____ b. habitat destruction

_____ c. boat-manatee collisions

_____ d. none of the above.

8. If hit by a power boat's propeller, a manatee

_____ a. may be killed.

_____ b. receives deep cuts which can become infected.

_____ c. will heal quickly due to their thick skin and vitamins from a high vegetable diet.

_____ d. a and b only.

9. Where are manatees found year-round in the U. S.?

_____ a. All coastal states.

_____ b. Coastal states, except Alaska and Hawaii.

_____ c. Florida only.

_____ d. Florida and California.

10. When the weather cools, manatees find warmth by migrating

_____ a. south.

_____ b. to power plants.

_____ c. to Florida's springs.

_____ d. all of the above.

11. Manatees may attain a size and weight of

_____ a. 25 feet - 4,000 pounds.

_____ b. 15 feet - 2,000 pounds.

_____ c. 6 feet - 500 pounds.

_____ d. 3 feet - 150 pounds.

12. Approximately how often does an adult female manatee give birth?

_____ a. 1 calf every 3-5 years.

_____ b. 1 calf every 6 months to a year.

_____ c. 3 calves each year.

_____ d. 1 calf every 6 months.

13. A manatee's diet consists of

_____ a. fruit.

_____ b. aquatic plants.

_____ c. small fish.

_____ d. lobsters, shrimp and crabs.

14. One contribution of manatees to man today is

_____ a. keeping sharks out of rivers and canals.

_____ b. unclogging canals of vegetation.

_____ c. guiding sailors who become lost.

_____ d. providing man with alligator-like skins.

15. It is against federal and state laws to

_____ a. kill a manatee.

_____ b. injure a manatee.

_____ c. harass a manatee.

_____ d. all of the above.

16. Where did you learn about manatees?

_____ a. School.

_____ b. Radio.

_____ c. Television.

_____ d. Other (please specify)

_____

_____

_____

_____

HOW MUCH DID YOU LEARN?

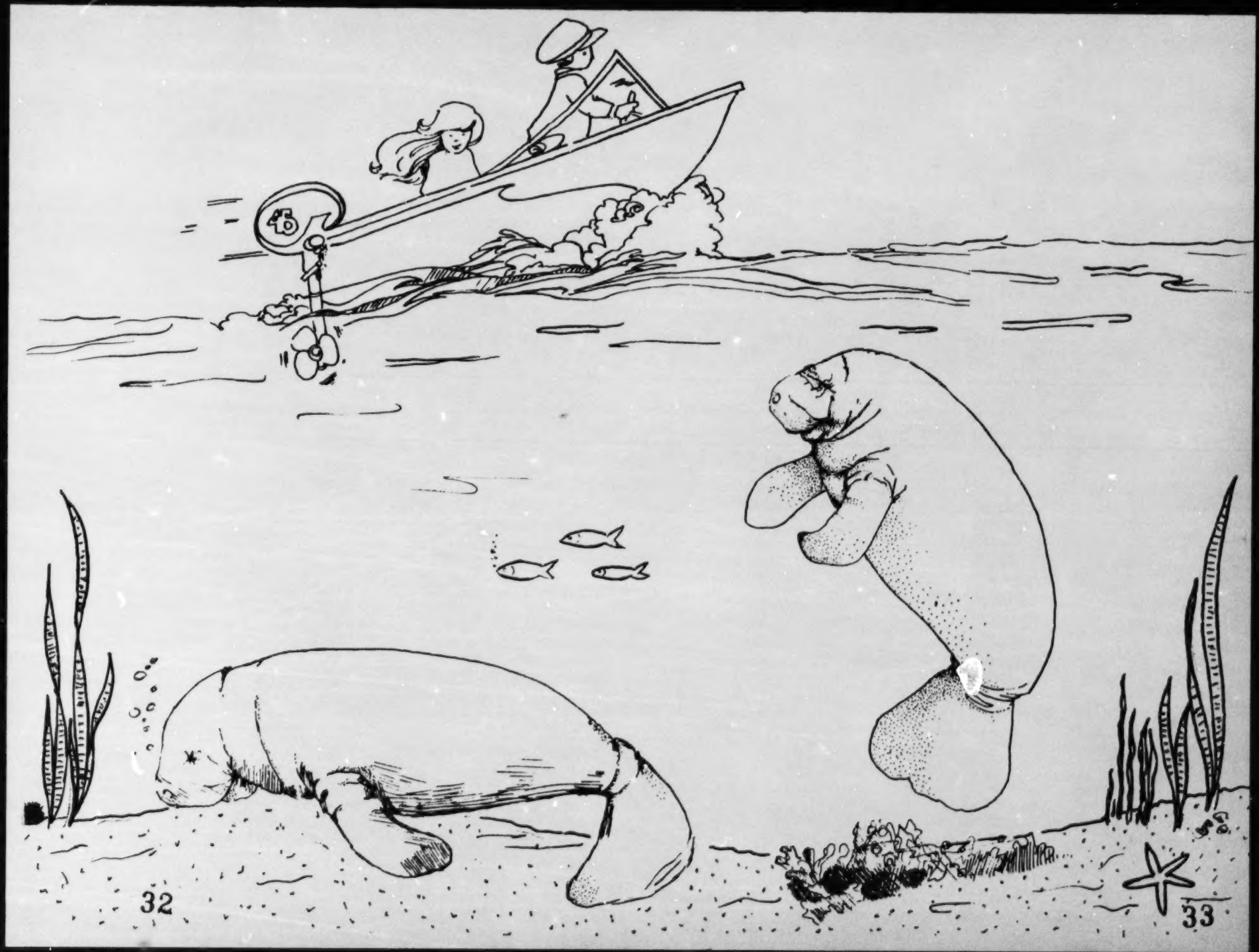
Fill in the blank.

1. The layer of fat beneath the skin of a manatee is called _____.
2. During the winter months, manatees seek refuge in the protected _____ _____.
3. The greatest threat facing the manatee is _____.
4. Another member of the manatee family, the _____, became extinct less than 30 years after it was discovered by man.
5. A close relative of the manatee is the dugong, which is easily distinguished by its _____.
6. Manatees are _____, which means they eat only _____.
7. It is estimated that there are only about _____ manatees remaining in Florida.
8. Two laws that protect the Florida Manatee are the _____ _____ and the _____ _____.
9. As warm-blooded mammals, manatees are sensitive to sudden drops in _____ _____.
10. You should report any manatee deaths, harassment or injury to the _____ _____ by calling the Manatee _____ _____.

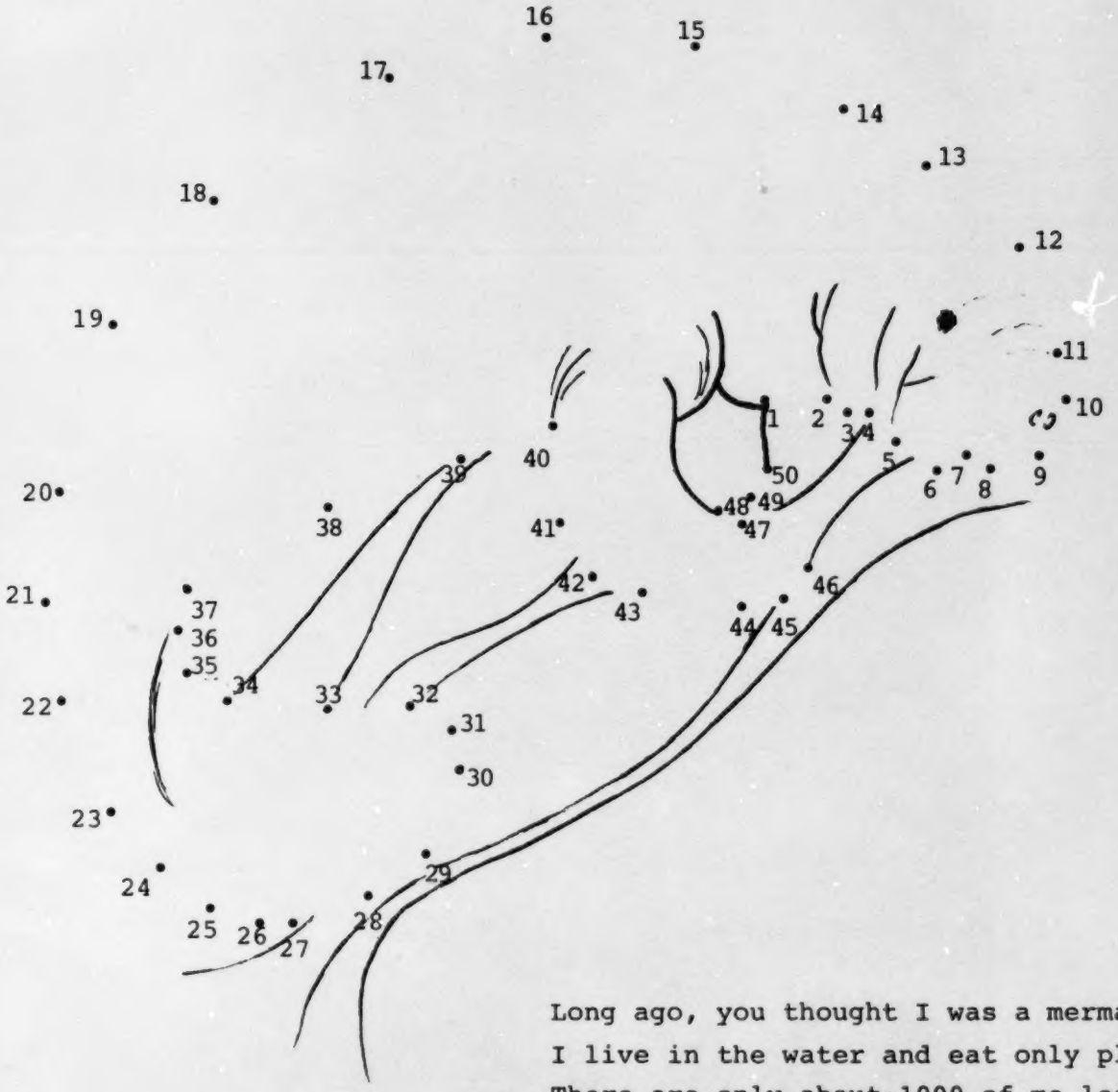
Questions to discuss:

1. What is an endangered species?
2. How is the body of a manatee adapted to its form of movement?
3. Describe the proboscis of the manatee and the animal's method of eating.
4. Discuss the Florida Manatee Sanctuary Act. Describe the areas closest to your community that are protected by the act.
5. Draw the different signs that indicate a manatee sanctuary area. Discuss where they are located and what they mean to a boater (or diver).

The following activity sheets have been produced under contract to the Florida Power and Light Company by Eco/Interface Evaluations (EIE). They may be reproduced without permission FOR EDUCATIONAL USE ONLY. Credit is requested for use in any publication, with 2 copies sent to Debbie Fritz-Quincy, EIE, P. O. Box 955, Hobe Sound, FL 33455.



WHO AM I?



Long ago, you thought I was a mermaid.
I live in the water and eat only plants.
There are only about 1000 of me left.
Your help is needed to save me.

WHO AM I?

FLORIDA'S _____

HOW MANY WORDS CAN YOU FIND IN

MANATEE?

A	MANE	NEAT
AM	MAT	NET
AN	MATE	TAME
ANT	MEAN	TAN
AT	MEANT	TEA
ATE	MEAT	TEAM
EAT	MEET	TEE
EM	ME	TEEM
EN	MEN	TEEN
MAN	MET	TEN

MANATEE FIELD STUDY

Date: Air Temperature:

Location: Water Temperature:

Time of Study: Weather Conditions:

1. How many manatees are present? _____
2. How many calves are present? _____
3. Estimate the length of the largest manatee present.

   _____

4. Describe any social interaction among the manatees.

   _____

   _____

   _____

   _____

   _____

5. Single out a manatee and observe its breathing habits. How often does it come to the surface to breathe? Observe at least two other manatees and their breathing habits. Record your observations.

   _____

   _____

   _____

   _____

   _____

6. How many manatees have barnacles on their backs? What does this indicate?

   _____

   _____

7. Watch for boaters and divers in the area and their interaction with the manatees. Are they obeying the law? Record your observations.

_____

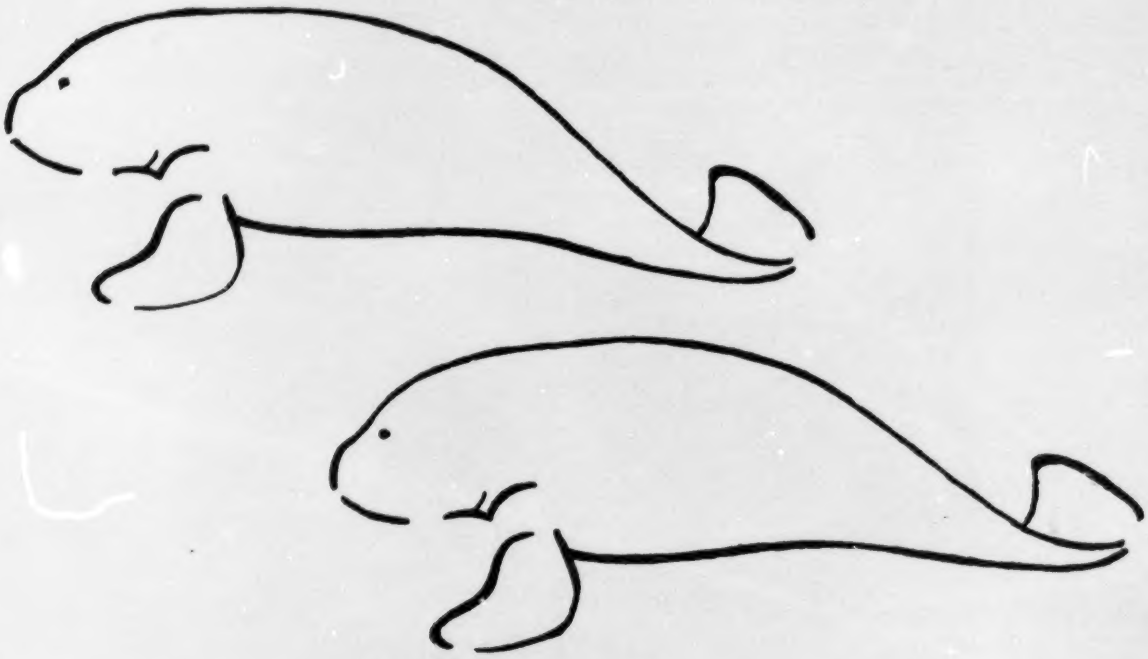
_____

_____

_____

_____

8. Draw some of the manatees' scar patterns or other body marks on the animals shown (Feel free to make comments).



9. Additional comments or observations:

_____

_____

_____

_____

_____

FIND-A-WORD

INSTRUCTIONS: Find the words listed below that deal with the Florida Manatee. Words may be found horizontally, vertically or diagonally.

Q W V E G E T A R I A N R T H M A F G M
E R A P O L L U T I O N P R C A C P R O
M E N R R L U O A D A C R L O M O E W L
O A D U G O N G C R I L O D E M N R E E
L S A D F E B A R K L V T S X A S T T R
A N L D E E R O J O S E E P T L E I L S
R W I A I B N I S H E S C R L W R E A K
S O S M R S I V M C L S T I S Y V E N T
E O M E Y E C L I M I T I N E T A I D R
A N E R A R H H A R I S O G A R T L S A
R D D M S E E R A A O W N T N N I D E I
R E F A G F L B A R G N I L A N O L N T
S D R I N U D R A G G B M L I S N O A W
P I L D U G C A L R A E P E E T I A T I
B A R G E E E M A H R R S I N S P R I L
I I A E N M A R I N E W C X I T P K A D
O T O D N G R E E W H E N L L O C X S L
M A S M S I R E O D P B L U B B E R Y I
S S P E E R A P W S A O D I V E N R T F
A Q U I T C H H Y A C I N T H X T I N E

WORD LIST

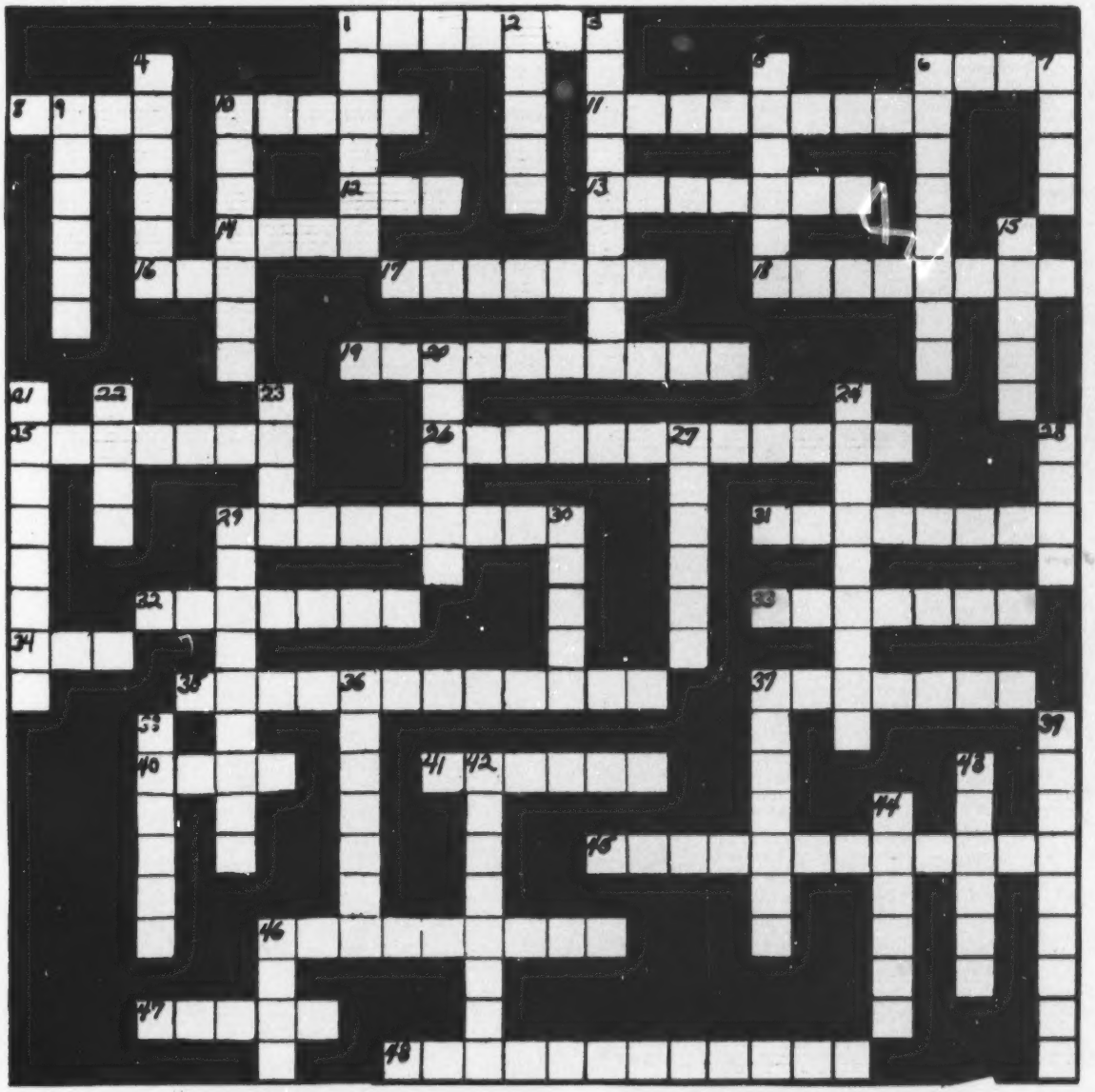
POLLUTION
MAMMAL
HABITAT
POWER PLANT
CONSERVATION
ENDANGERED
HYACINTH
SIRENIA
MOLARS
MERMAID
ENVIRONMENT
SPRING
NICHE
BLUBBER
MARINE
COLLISION
DIVERS
PROBOSCIS
REFUGE
DUGONG
PROTECTION
SPECIES
DISCHARGE
LOCKS
WETLANDS
VEGETARIAN
BIOME
VANDALISM
BARGE
WILDLIFE

SCRAMBLED WORDS

INSTRUCTIONS: The words listed below all pertain to the Florida Manatee. See how many of them you can unscramble.

SHRSATEANM	_ _ _ _ _ _ _ _ _ _
COHIANGP	_ _ _ _ _ _ _ _
MALTROIYT	_ _ _ _ _ _ _ _ _
CHINE	_ _ _ _ _
CAYIHHTN	_ _ _ _ _ _ _ _
NONCAESRTVOI	_ _ _ _ _ _ _ _ _ _ _ _
EEUFGR	_ _ _ _ _ _
MTIENVORENN	_ _ _ _ _ _ _ _ _ _ _
AEIMRMD	_ _ _ _ _ _ _
EREPOLPLR	_ _ _ _ _ _ _ _ _
TXITECN	_ _ _ _ _ _ _
OPEWR ATNLP	_ _ _ _ _ _ _ _ _ _
EIN SAIN	_ _ _ _ _ _ _ _
EAGIREVATN	_ _ _ _ _ _ _ _ _ _
NAEDGENEDR	_ _ _ _ _ _ _ _ _ _
REBLBUB	_ _ _ _ _ _ _
EAYUTRS	_ _ _ _ _ _ _
IECEPSS	_ _ _ _ _ _ _
ERACIDSHG	_ _ _ _ _ _ _ _ _
TLIFOAMNMNOE	_ _ _ _ _ _ _ _ _ _ _ _

MANATEE CROSSWORD



ACROSS

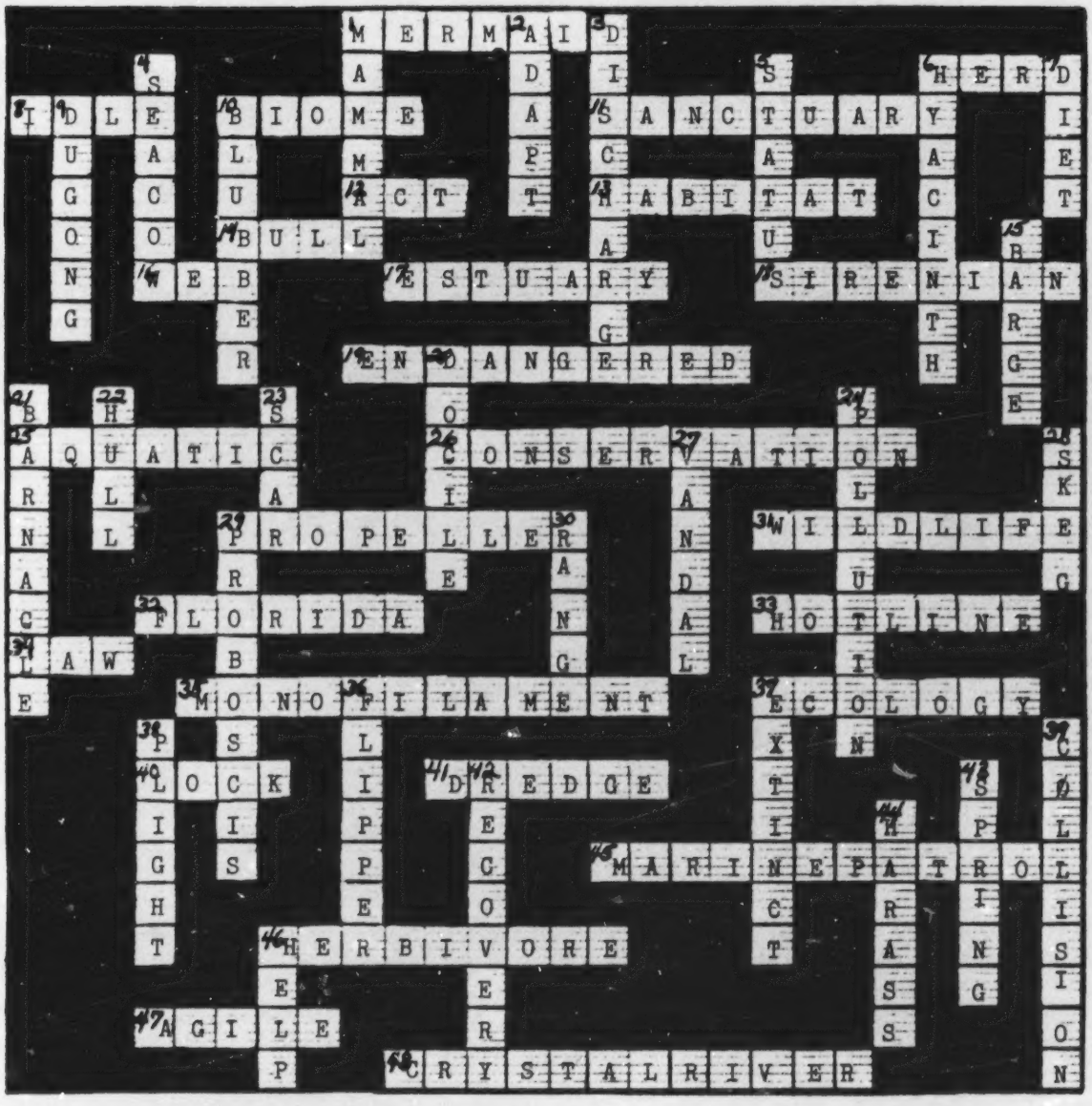
1. Legendary sea creature that is part-woman and part-fish.
6. A group of manatees feeding or living together.
8. Slowest possible boat speed while maintaining steerage.
10. Large land area with similar organisms and physical environment.
11. Refuge.
12. A law.
13. The place where an animal lives.
14. An adult male manatee.
16. Food chain or _____.
17. A highly productive, coastal body of water that is connected to the open sea and is diluted with fresh water.
18. Manatees belong to this zoological order.
19. Placed in jeopardy; expose to loss.
25. Growing or living in water.
26. The care and protection of our natural resources.
29. Part of a boat known to injure and kill manatees.
31. Birds and animals that are not domestic.
32. The "Sunshine State."
33. A 24-hour emergency telephone number.
34. Rules of conduct passed by an authority of a nation.
35. Type of fishing line.
37. The study of interrelationships existing between organisms and their environment.
40. A water level control structure.
41. Deepen a channel.
45. The law protecting manatees are enforced by the Florida _____ _____ (2 words).
46. Any animal that eats only vegetation may be considered this.
47. Quick and easy in movement.
48. A favorite spot for divers and manatees on Florida's west coast (2 words).

DOWN

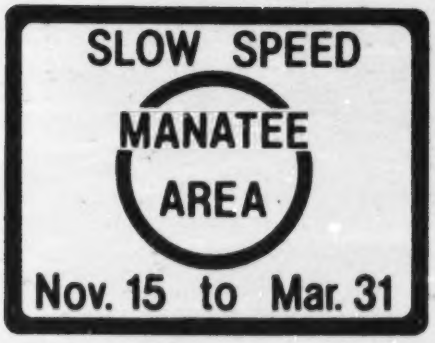
1. Manatees and people are members of this class of warm-blooded animals.
2. To adjust to new surroundings.
3. To release as in warm water from power plants into natural waters.
4. Another name for manatee.
5. Rank or position.
6. A pesty member opf the lily family that is found in fresh water.
7. What an animal usually eats.
9. Forked-tail member of the manatee family.
10. Layer of fat beneath the skin of marine mammals.
15. A large, flat-bottomed boat used for carrying freight.
20. Easy-going, mild-mannered.
21. A shell-bearing sea animal that attaches itself to rocks and other animals.
22. The frame or main body of a boat.
23. A mark left after a wound.
24. The presence of any undesirable substance in the environment.
27. One who destroys or damages.
28. An extension of the stern edge of the keel of a boat.
29. Snout of a manatee.
30. Distance traveled, limited area.
36. A broad, flat limb adapted for swimming.
37. No longer in existence.
38. A distressing situation.
39. Clash or conflict.
42. A return to health, regaining of something lost.
43. A flow of water from the ground.
44. To worry or torment.
46. Without your _____, the manatee will not survive.

MANATEE CROSSWORD

KEY

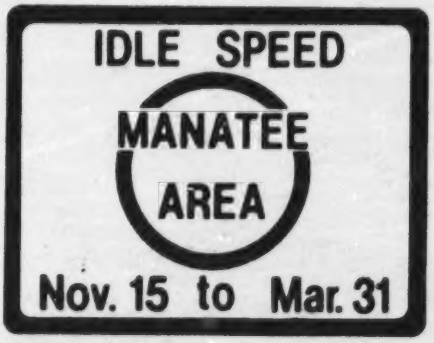


MANATEE SANCTUARY SIGNS



This sign appears on the fringe of protected areas from November 15 to March 31 of each year.

This sign appears on the fringe of the protected areas; you will see it as you leave the area.



This sign appears in the center of the protected areas.

This sign appears from the St. Lucie Inlet to Jupiter Inlet.

This sign appears in the Crystal River Sanctuary.